2005 National Software and Complex Electronic Hardware Standardization Conference

RTCA Special Committee 200 Integrated Modular Avionics Progress Report

DO-XXX Integrated Modular Avionics (IMA) Development Guidelines and Certification Considerations

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July 28, 2005

RTCA SC-200 Integrated Modular Avionics: Progress Report

- **Background**

  - Established January, 2002; joint with EUROCAE WG-60

  - Terms of Reference: "Propose, document and deliver means to support the certification (or approval) of modular avionics, systems integration, and hosted applications, including considerations for installation and continued airworthiness in all categories and classes of aircraft."

  - Final Review and Comment (FRAC) complete

  - Rev N available for committee internal final review

  - Final meeting @ CAA, Gatwick, 8/31-9/2/05

  - Anticipated publication in Fall 2005; FAA AC will follow

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- **Purpose of Document**

"This document contains guidance for Integrated Modular Avionics (IMA) developers, application developers, integrators, certification applicants, and those involved in the approval and continued airworthiness of IMA systems in civil certification projects."

- **Definitions**

- IMA: "Integrated modular avionics (IMA) are considered to be a shared set of flexible, reusable, and interoperable hardware and software resources, that, when integrated, create a platform that provides services, designed and verified to a defined set of safety and performance require-ments, to host applications performing aircraft-related functions."

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- **Definitions** (Continued)

- Platform: "Module or group of modules, including core software, that manages resources in a manner sufficient to support at least one application. ---- The platform establishes a computing environment, support services, and platform-related capabilities, such as health monitoring and fault management. The IMA platform may be accepted independently of hosted applications."

- Module: "A component or collection of components that may be accepted by themselves or in the context of IMA. A module may also comprise other modules. A module may be software, hardware, or a combination of hardware and software, which provides resources to the IMA-hosted applications.

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- **Definitions (Concluded)**

- Application: "Software and/or application-specific hardware with a defined set of interfaces that, when integrated with a platform, performs a function."

- Incremental acceptance: "A process for obtaining credit toward approval and certification by accepting or finding that an IMA module, application, and/or off-aircraft IMA system complies with specific requirements. This incremental acceptance is divided into tasks. Credit granted for individual tasks contributes to the overall certification goal. Incremental acceptance provides the ability to integrate and accept new applications and/or modules in an IMA system and maintain existing applications and/or modules without the need for re-acceptance."

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- **Six Tasks**
  - Task 1: Module acceptance
  - Task 2: Application software/hardware acceptance
  - Task 3: IMA system acceptance
  - Task 4: Aircraft integration of IMA system - including Validation and Verification (V&V)
  - Task 5: Change of modules or applications
  - Task 6: Reuse of modules or applications

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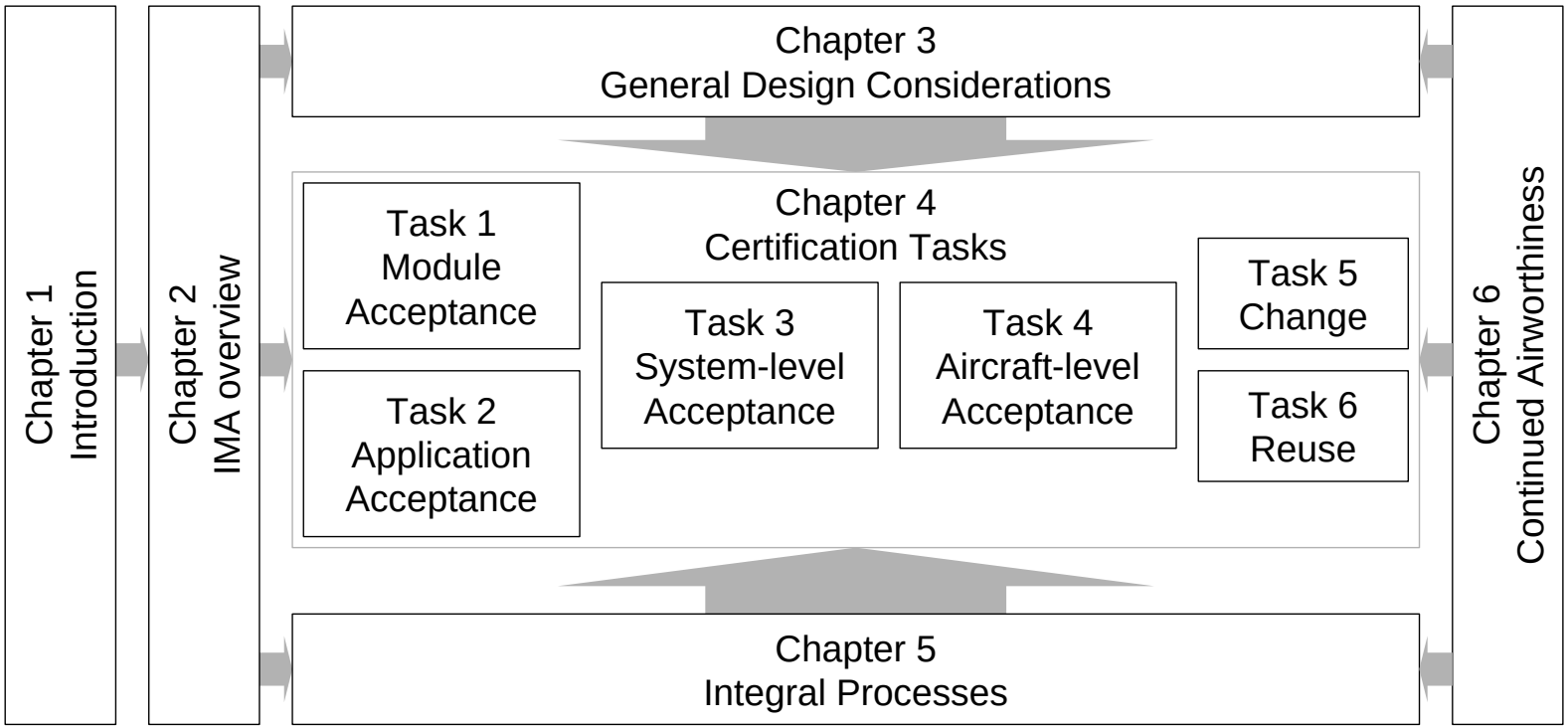

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- **Objectives Charts**

  - **Objective charts similar to DO-178**

Table A-1 Module/platform development and acceptance (Task 1) objectives (examples)

ID	Objective Summary	Doc Ref	Life Cycle Data Description*	Life Cycle Data Reference	Control Category
1	Module/platform development and acceptance life cycle, and associated processes, are consistent with the guidance of DO-160, DO-178, DO-254 and this document.	4.2.1a 3.1.1a	Module/platform Acceptance Plan	4.2.3	CC1
2	Module/platform requirements specifications are: - defined - traceable - verifiable	4.2.1b 3.1.1b	Module/platform require-ments specifications Traceability data	4.2.4 4.2.5	CC1/CC2 CC1 CC2
3	Module/platform design is documented and addresses the IMA unique failure modes, safety analysis, and functionality.	3.1.1c 4.2.1b,c	Module/platform design data Module/platform failure anal-ses and safety analyses	4.2.4 4.2.12	CC1 CC1
4	Qualify verification and development tools, as needed.	4.2.1i 3.4, 3b	Module tool qualification data	4.2.12c	CC2CC1

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- **Objectives Charts (Continued)**

Table A-2: Hosted application development and acceptance (Task 2) objectives (examples)

ID	Objective Summary	Doc Ref	Life Cycle Data Description	Life Cycle Data Reference	Control Category
1	Acceptance plans for the hosted applications are complete and identify the IMA platform resources to be used and address IMA system unique aspects of the life cycle development and verification processes.	3.1.2	PSAC/PHAC for hosted applications	4.3.2*	CC1
2	Demonstrate compliance of applications to the appropriate guidance (software DO-178/ED-12, and hardware DO-254/ED-12) and develop the appropriate life cycle data.	3.1.2 4.3.1d, e	Application life cycle data*	4.3.2*	*
3	Define the platform resources, required by the hosted application. Define the application's safety, HM/FM, environmental qualification, resources outside the platform, human factors aspects as required	4.3.1b 3.1.2	Hosted application requirements data	4.3.2*	CC1*

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- **Objectives Charts (Concluded)**

Table A-3: IMA system-level development and acceptance (Task 3) objectives (examples)

ID	Objective Summary	Doc Ref	Life Cycle Data Description	Life Cycle Data Reference	Control Category
1	Plan the IMA system activities with the intent of using the integration, validation, and verification for aircraft-level certification credit	3.1.3 c 4.4.1a	IMA System Certification Plan IMA System V&V Plan	4.4.3 4.4.4	CC1 CC1
2	IMA system safety assessments and analyses are complete.	3.1.3 b, d 4.4.1 f	Safety assessments and analyses reports	4.4.7d	CC1
3	IMA system safety capabilities are identified	3.1.3 a,b,c 3.b	IMA System Certification Plan IMA System Verification and Validation Plan Safety assessment and analyses reports	4.4.3 4.4.4	CC1 CC1
4	The IMA system architecture is defined and documented.	3.1.3 c	IMA System Requirements and Design Data	4.4.3	CC1

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- **Conclusion**
  - RTCA SC-200 work nearly complete
  - DO-XXX Integrated Modular Avionics (IMA) Development Guidelines and Certification Considerations to be published this fall
  - AC to follow
  - Principal portions of document are objective tables to be used in acceptance and/or certification activities